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Indian Standard

RATIONALIZED STEELS FOR THE AUTOMOBILE AND ANCILLARY INDUSTRY

PART 29 MECHANICAL AND PHYSICAL PROPERTIES OF 40Ni10Cr3Mo6 GRADE STEEL

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Indian Standard

RATIONALIZED STEELS FOR THE AUTOMOBILE AND ANCILLARY INDUSTRY

PART 29 MECHANICAL AND PHYSICAL PROPERTIES OF 40Ni10Cr3Mo6 GRADE STEEL

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Indian Standard

**RATIONALIZED STEELS FOR
THE AUTOMOBILE AND
ANCILLARY INDUSTRY**

**PART 29 MECHANICAL AND PHYSICAL PROPERTIES OF
40Ni10Cr3Mo6 GRADE STEEL**

0. FOREWORD

0.1 This Indian Standard (Part 29) was adopted by the Indian Standards Institution on 13 March 1987, after the draft finalized by the Co-ordinating Committee on Materials for Automobiles had been approved by the Structural and Metals Division Council.

0.2 Part 1 of this standard, published in 1979, covers the chemical composition of 33 rationalized steels. The mechanical properties, hardenability and isothermal transformation characteristics of these 33 rationalized steels are being covered in different parts of this standard (Parts 2 to 34). The data concerning these properties given in this standard is only for guidance and information purposes.

0.3 For the purpose of deciding whether a particular requirement of this standard is complied with, the final value, observed or calculated, expressing the result of a test or analysis, shall be rounded off in accordance with IS : 2-1960*. The number of significant places retained in the rounded off value should be the same as that of the specified value in this standard.

1. SCOPE

1.1 This standard (Part 29) covers the chemical composition, mechanical properties and hardenability and isothermal transformation characteristics of 40Ni10Cr3Mo6 grade of steel for use by automobile and ancillary industry.

*Rules for rounding off numerical values (revised).

2. CHEMICAL COMPOSITION

2.1 The chemical composition of this grade of steel shall be as given below:

Constituents, Percent

C	Si	Mn	Ni	Cr	Mo	S	P
0.36 to 0.44	0.15 to 0.35	0.40 to 0.70	2.25 to 2.75	0.50 to 0.80	0.40 to 0.70	0.035 Max	0.035 Max

3. HARDNESS

3.1 The maximum hardness for this grade of steel delivered in the annealed condition when determined in accordance with IS : 1500-1983* shall be 277 HB.

4. MECHANICAL PROPERTIES

4.1 The mechanical properties of this grade of steel in the hardened and tempered condition, when determined in accordance with IS : 1598-1977† and IS : 1608-1972‡, shall be as given in Table 1.

TABLE 1 MECHANICAL PROPERTIES IN THE HARDNESS AND TEMPERED CONDITION

LIMITING RULING SECTION	TENSILE STRENGTH	0.2 PERCENT PROOF STRESS Min	ELONGATION G.L. 5.65 \sqrt{A} Min	IZOD IMPACT VALUE, Min JOULES AT ROOM TEMP	HARDNESS HB
mm	MPa	MPa	PERCENT		
150	1 000-1 150	800	12	40	285-341
150	1 100-1 250	880	11	35	311-363
150	1 200-1 350	1 000	10	30	341-401
100	1 150	1 300	7	12	444 Min

5. HOT WORKING AND HEAT TREATMENT TEMPERATURES

5.1 The recommended hot working and heat treatment temperatures shall be as given below:

Forging/rolling	1 200°C
Annealing temperature	830-850°C
Process annealing temperature	650-700°C
Hardening temperature	830-850°C
Tempering temperature	660°C Max

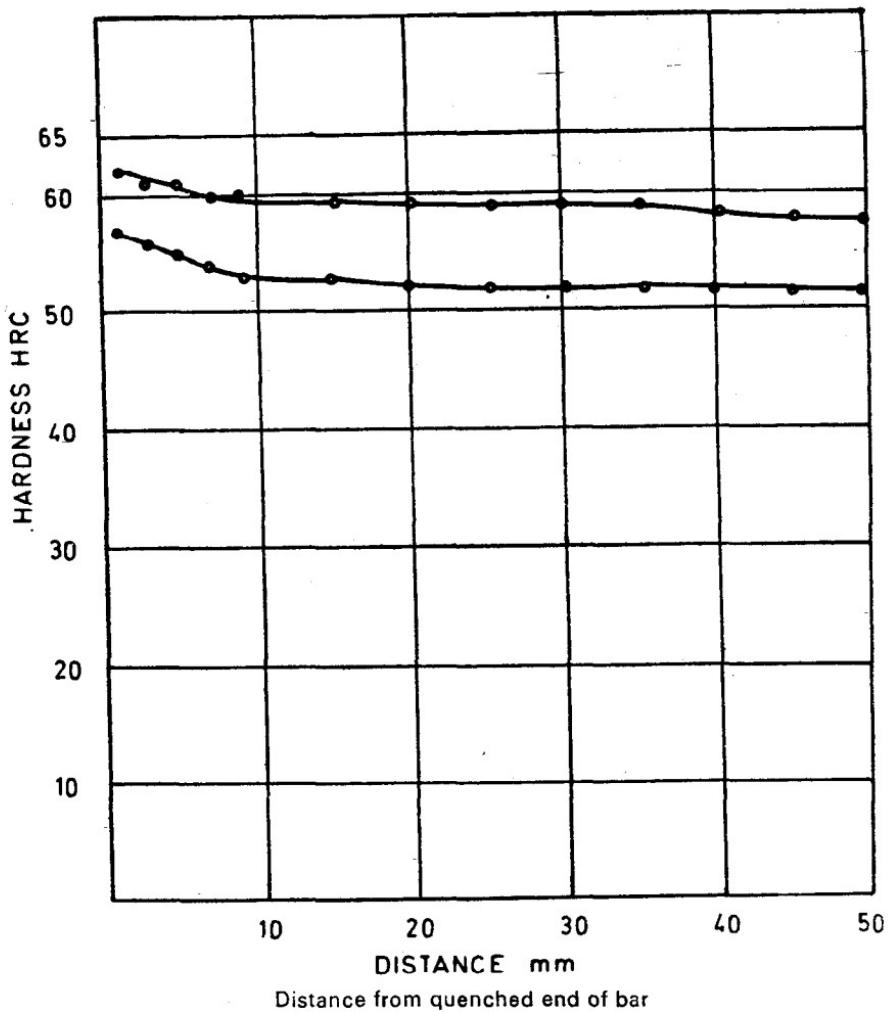
6. HARDENABILITY

6.1 The end quench hardenability band is given in Fig. 1.

*Method for Brinell hardness test for metallic materials (*second revision*).

†Method for izod impact test of metals (*first revision*).

‡Method for tensile testing of steel products (*first revision*).



Distance from quenched end of bar

Distance mm	1	2	3	4	5	6	7	8	9	10	15	20	25	30	35	40	45	50
HRC Max	62	62	61	61	61	61	60	60	60	60	60	59	59	59	59	58	58	58
HRC Min	57	57	56	56	55	54	54	54	53	53	53	52	52	52	52	52	52	52

FIG. 1 END QUENCHED HARDENABILITY BAND FOR 40Ni10Cr3Mo6 GRADE STEEL

7. EFFECT OF TEMPERING ON MECHANICAL PROPERTIES

7.1 The curves for effect of tempering on the mechanical properties of the steel are given in Fig. 2.

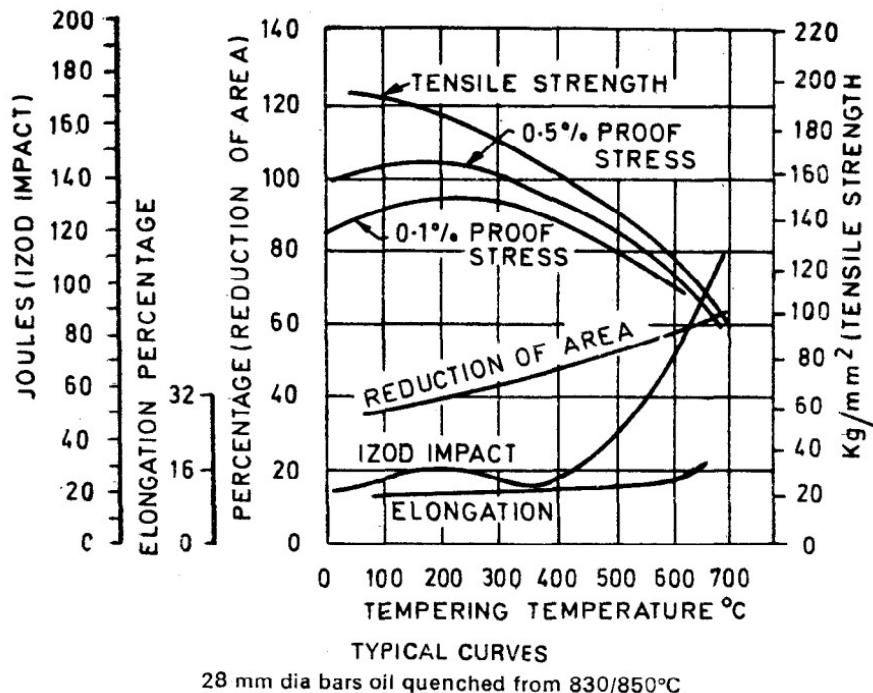


FIG. 2 CURVES SHOWING THE EFFECT OF TEMPERING TEMPERATURE ON MECHANICAL PROPERTIES OF 40Ni10Cr3Mo6 GRADE STEEL

8. EFFECT OF SECTION SIZE ON MECHANICAL PROPERTIES

8.1 The curves for the effect of section size on mechanical properties are given in Fig. 3 to 5.

9. MACHINABILITY

9.1 The machinability of this grade of steel in the annealed condition is approximately 50 percent of that for mild steel (20C8), and in hardened and tempered condition it is 20-35 percent of that for mild steel (20C8).

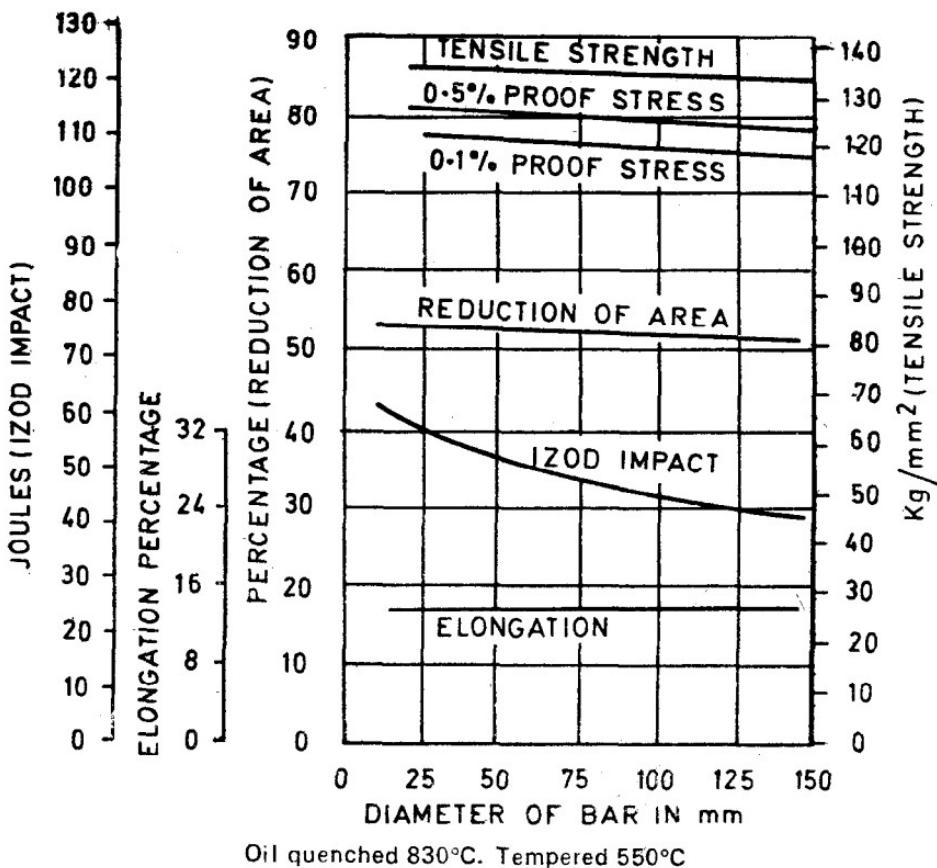


FIG. 3 , CURVES SHOWING THE EFFECT OF SECTION SIZE ON MECHANICAL PROPERTIES OF 40Ni10Cr3Mo6 GRADE STEEL

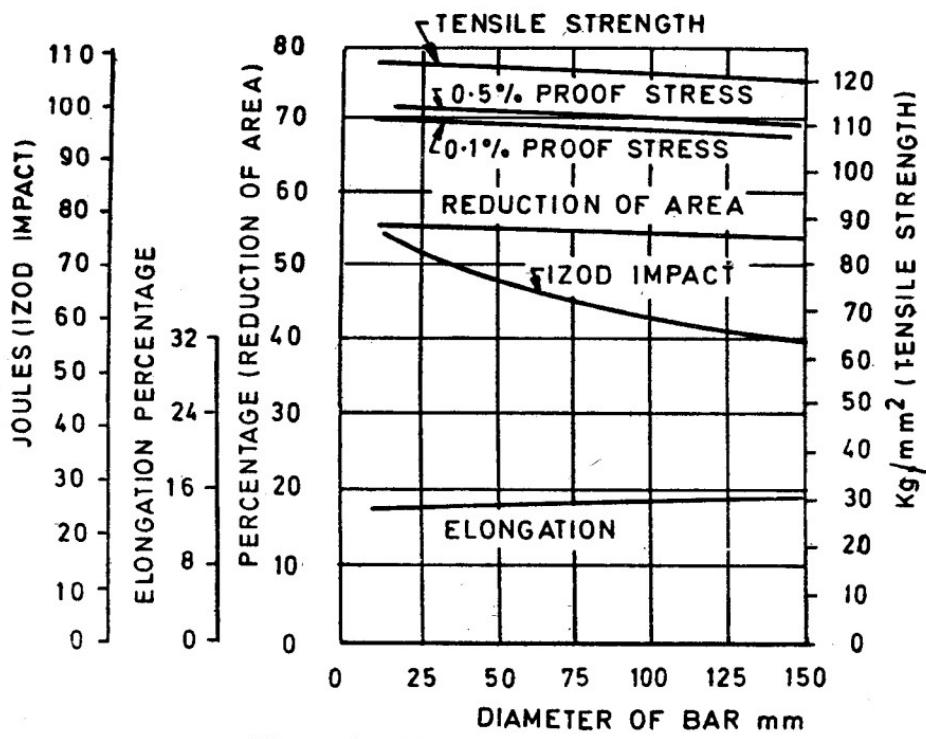


FIG. 4 CURVES SHOWING THE EFFECT OF SECTION SIZE ON MECHANICAL PROPERTIES OF 40Ni10Cr3Mo6 GRADE STEEL

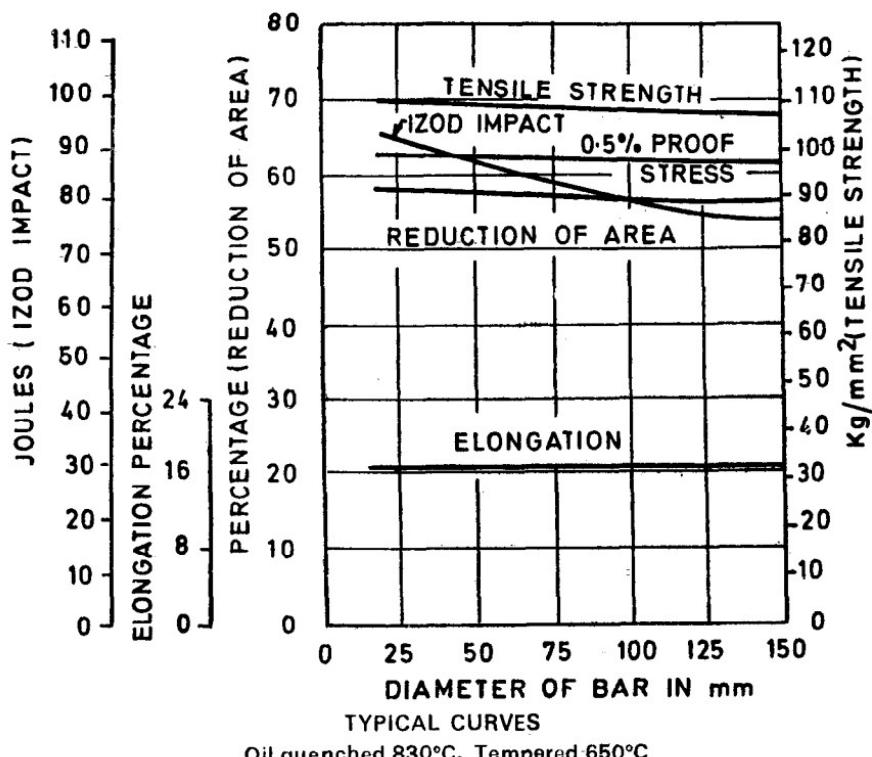


FIG. 5 CURVES SHOWING THE EFFECT OF SECTION SIZE ON MECHANICAL PROPERTIES OF 40Ni10Cr3Mo6 GRADE STEEL
Oil quenched 830°C. Tempered 650°C

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